

## REMARKS

Applicant amends independent claims 44 and 55 to include the limitations:

- (i) the selected required queue position corresponds to multiple of the work items; and
- (ii) the selected required queue position does not correspond to any work items and wherein the selected required queue position is closer to a head of the work queue than another selected required queue position that corresponds to at least one of the work items.

The limitations are supported by the Specification. Support for these elements includes page 4, line 18, to page 5, line 4; page 20, line 17, to page 21, line 1; page 22, lines 3-6; page 22, line 9, to page 23, line 3; and page 26, line 1, to page 27, line 8.

The Examiner rejects claims 44-60 under 35 U.S.C. §103(a) as being unpatentable over IP 1 246 097 (hereinafter '097) in view of U.S. Application No. 2002/0131399 (Philonenko).

Applicants respectfully traverse the Examiner's rejections. The cited references fail to teach or suggest at least the following italicized features of independent claims 44 and 55:

44. A method, in a contact center comprising a central server for distributing work items to workstations of a first set of resources, and a work queue having a plurality of work items, the method comprising:

receiving the plurality of work items at at least one telecommunications component of the contact center from a plurality of customers;

*generating, in a workload monitoring agent, based at least in part on said work queue, an ordered set of items related to the plurality of work items in the work queue;*

*analyzing, by said workload monitoring agent, said ordered set, wherein the analyzing step determines a required queue position for each of the plurality of work items, wherein at least one of the following is true for a selected required queue positions;*

- (i) *the selected required queue position corresponds to multiple of the work items; and*
- (ii) *the selected required queue position does not correspond to any work items and wherein the selected required queue position is closer to a head of the ordered set than another selected required queue position that corresponds to at least one of the work items;*

*based on said analyzing step, determining in said workload monitoring agent a state of said work queue;*

forwarding work items in the work queue to workstations of the first set of resources; and

*when the workload monitoring agent predicts a surplus of work items, additionally forwarding work items to workstations of a second set of resources.*

55. A contact center, comprising:  
at least one work queue of a plurality of work items from a plurality of customers;  
a plurality of workstations corresponding to a first set of resources;  
a workload monitoring agent operable to:  
*generate, based at least in part on said work queue, an ordered set of items related to the plurality of work items in the work queue;*  
*analyze said ordered set, wherein the analyzing step determines a required queue position for each of the plurality of work items, wherein at least one of the following is true for a selected required queue positions;*  
(i) *the selected required queue position corresponds to multiple of the work items; and*  
(ii) *the selected required queue position does not correspond to any work items and wherein the selected required queue position is closer to a head of the work queue than another selected required queue position that corresponds to at least one of the work items;*  
*determine a state of said work queue based on said analysis;*  
cause the work items in the work queue to be forwarded to workstations of the first set of resources; and  
*when the state corresponds to a predicted surplus of work items, additionally cause work items to be forwarded to workstations of a second set of resources.*

The '097 reference is directed to a work allocation system that uses a system of agents that allocate work via market-based and preference learning mechanism. Work is allocated by the agents operating in a marketplace using contract net based negotiation and a learning algorithm is used to form profiles and preferences for each worker that is managed in a workgroup, so that the mediator agent for that workgroup can allocate appropriate work and use the profile of a worker's learned working preferences to decide the pricing of the work offered by mediators to workers.

The '097 reference is silent on the above-highlighted features. The '097 reference says nothing about creating an ordered set of items in addition to the work queue, analyzing the ordered set, predicting a surplus of work items, or causing work items, as a result, to be forwarded to workstations of a second set of resources. The reference is further silent about the queuing of the work items.

Philonenko does not overcome the deficiencies of the '097 reference. Philonenko is directed to a routing system for routing communication events. The system includes a data queue for queuing incoming events, an interaction mechanism for enabling bi-directional communication with authors of events in queue and a processor for processing events in queue according to routing rules. Authors of the communication events are solicited through the interaction mechanism to make a value contribution in exchange for advancement in the data queue.

Like the '097 reference, Philonenko says nothing about creating an ordered set of items *in addition to* the work queue, analyzing the ordered set, predicting a surplus of work items, or causing work items, as a result, to be forwarded to workstations of a second set of resources. Philonenko, at Figs. 2-4, teaches that, for each queue position, there is one and only one work item. No queue position at or near the head of the queue can be without an occupant when positions further from the head are occupied.

Accordingly, the independent claims are allowable.

The dependent claims provide further bases of allowance.

By way of example, claim 46 requires, if the state indicating a surplus of work items being predicted is a future risk state, the further step of predicting when the surplus of work items will occur, and additionally forwarding work items in the work queue to workstations of the second set of resources in dependence on said prediction. The cited references say nothing about this feature.

Claim 47 requires said required queue position ("RQP") to be based on a service time goal for each work item and a weighted advance time of the work queue. The cited references say nothing about this feature.

Claim 48 requires the generating step to include:

creating an array of counters, each element in said array of counters corresponding to a predefined range of RQP's; and

incrementing a counter in said array of counters associated with the RQP for each work item; and wherein said determining step includes:

for each work item, subtracting from the service time goal for said work item an amount of time since said work item was received to obtain a remaining time for said work item. The cited references say nothing about this feature.

Claim 49 requires the determining step to include:  
determining said weighted advance time of the work queue; and  
for each work item, dividing said remaining time by said weighted advance time for the work queue. The cited references say nothing about this feature.

Claim 50 requires the generating step to further include:  
determining a range of RQP's which correspond to each item within said ordered set, wherein, when a number of a selected item is N, said predefined range of queue positions for the selected item in said ordered set, is  $2^{N-1} < \text{RQP} \leq 2^N$ . The cited references say nothing about this feature.

Claim 51 requires said analyzing step to include:  
creating an index variable;  
setting the index variable to one;  
creating a sum variable;  
setting said sum variable to zero;  
calculating a new sum as the sum of the previous value of the sum variable and the value of the item in the ordered set which corresponds to the index variable;

determining the highest required queue position, RQP, associated with the item in the ordered set which corresponds to the index variable;  
determining if the sum is greater than said highest RQP;  
setting a state to "Future Risk" when said sum is greater than said highest RQP; and  
incrementing said index and repeating said calculating a new sum, determining a highest RQP, determining if the sum is greater than the highest RQP, and setting a state steps when said sum is not greater than said highest RQP. The cited references say nothing about this feature.

Claim 52 requires the analyzing step to further include:  
determining if there are additional items in said ordered set;  
setting a state to "On Target" when there are no additional items in said ordered set; and  
when said sum is greater than said highest RQP, predicting a time and/or extent of said "Future Risk". The cited references say nothing about this feature.

Claim 53 requires said time to be calculated as the product of the index and the weighted advance time for the work queue and wherein said extent is calculated as the difference between said sum and said highest RQP. The cited references say nothing about this feature.

Claim 56 requires each of said work items to have an associated service time goal, said workload monitoring agent being further adapted to:

- (a) monitor said at least one queue of work items;
- (b) assess a state of said at least one queue of work items with respect to the service time goals for said plurality of work items;
- (c) determine a number of work items which are likely not to meet their service time goals and a time at which the service time goal for said number of work items will expire; and
- (d) in response to determining a number of work items are likely not to meet their service time goals, assign at least one resource from the second set of resources to at least one of said work items. The cited references say nothing about this feature.

Claim 57 requires the workload monitoring agent to be further operable to (i) identify a weighted advance time for servicing of work items, (ii) determine a required queue position for each of said work items, (iii) determine said required queue position based on the weighted advance time for servicing of work items, an elapsed time since the work item was received at said at least one queue, and a service time goal for the work items, and (iv) determine, from the at least one queue, a representation of required queue positions associated with the work items in said at least one queue. The cited references say nothing about this feature.

Claim 58 requires said required queue position to be calculated as the difference between the service time goal and the elapsed time divided by the weighted advance time for servicing of work items. The cited references say nothing about this feature.

Claim 59 requires a predetermined workload level to exist when a queue position in the representation of required queue positions is less than a number of enqueued work items ahead of the queue position in the representation of required queue positions, wherein the time at which the predetermined workload level will likely exist is the product of the weighted advance time for servicing of work items and queue position at which the predetermined workload level will likely exist; and wherein the number of work items required to be serviced is the difference between the required queue position and the number of enqueued work items before the required queue position. The cited references say nothing about this feature.

Applicant has added new claims 61-86.

Independent claims 61 and 75 are allowable because the cited references fail to teach or suggest at least the following italicized features:

61. A method, comprising:  
receiving the plurality of work items at at least one telecommunications component of the contact center from a plurality of customers;  
assigning the work items to at least one work queue serviced by a first set of resources;  
*generating, in a workload monitoring agent, based at least in part on said work queue, an ordered set of items related to the plurality of work items in the work queue;*  
*analyzing, by said workload monitoring agent, said ordered set, wherein the analyzing step determines a required queue position for each of the plurality of work items, wherein at least one of the following is true for a selected required queue positions;*  
(i) *the selected required queue position corresponds to multiple of the work items; and*  
(ii) *the selected required queue position does not correspond to any work items and wherein the selected required queue position is closer to a head of the ordered set than another selected required queue position that corresponds to at least one of the work items; and*  
*based on said analyzing step, assigning the work items in the work queue to the first set of resources..*

75. A contact center, comprising:  
at least one work queue of a plurality of work items from a plurality of customers;  
a first set of resources;  
a workload monitoring agent operable to:  
*generate, based at least in part on said work queue, an ordered set of items related to the plurality of work items in the work queue;*  
*analyze said ordered set, wherein the analyzing step determines a required queue position for each of the plurality of work items, wherein at least one of the following is true for a selected required queue positions;*  
(i) *the selected required queue position corresponds to multiple of the work items; and*  
(ii) *the selected required queue position does not correspond to any work items and wherein the selected required queue position is closer to a head of the work queue than another selected required queue position that corresponds to at least one of the work items; and*  
*based on the required queue positions, assign the work items in the work queue to be forwarded to the first set of resources.*

Based on the foregoing, Applicants believe that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,

SHERIDAN ROSS P.C.

Date:

April 26, 2010

By:

Douglas W. Swartz

Douglas W. Swartz

Reg. No. 37,739

1560 Broadway, Suite 1200

Denver, Colorado 80202

Telephone: 303-863-9700